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## WHITE PAPER

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**AGB64LV01-QC  
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AGB75LC04-QU-E**

### **Easily go from Monochrome to Color GUI**

#### **Introduction:**

Using Amulet's Monochrome Starter Kit is a great way to get a jump on the design of your Color GUI using Amulet's upcoming Color Chip. This paper will chronicle some of the most important differences between the two chips to provide insight into what exactly is involved when upgrading uHTML from monochrome to color.

#### **Includes:**

- What is the same
- What is different
- The transition to color

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Using Amulet's Monochrome Starter Kit is a great way to get a jump on the design of your Color GUI using Amulet's upcoming Color Chip. This paper will chronicle some of the most important differences between the two chips to provide insight into what exactly is involved when upgrading uHTML from monochrome to color.

*What's the same:* The development environment is exactly the same. You can use the same off the shelf HTML editor. The HTML Compiler software looks and feels the same with a few additions to handle a wide range of displays out there. You can even use the same HTML code!

*What's different:* Objects can now have 32-bit colors associated with them. That includes your standard 8-bit Red, Green, and Blue channels and plus an 8-bit alpha channel for 256 levels of transparency per pixel. This allows for drag-and-drop support of PNG image files. There is also native JPEG decompression algorithms, static GIF, and Animated GIF support.

*The transition to color:* The Color OS comes with the same set of widgets as the Monochrome OS, like your buttons, sliders, graphs, etc. Ignoring the very few LCD-specific changes you may have to make to the HTML, your monochrome code will compile and run on a color OS. This will simply look black and white (the default colors if none are specified) plus any color images you already have. You can then begin to colorize the GUI. Let's go over the new color parameters for your widgets:

*FontColor:* Applies to anything with a font (Button Labels, String fields, etc)

*BorderColor:* Used in most widgets where Border size > 0

*FillColor:* used in Bar graph, list, lineGraph, linePlot, numericField and stringField

*LineColor:* LineGraph, Line Plot, and Scribble widget line drawing color

*AlphaColor:* Highlight effect, used in anchors around text (hyperlink), widgets, or raw images. The monochrome OS only inverted an anchor's contents.

*Transparency:* tells the OS to use the transparency in the image (true or false)

The value of any color parameter can be one of four things. It can be a standard HTML color, like "aqua" or "blue," or use a hexadecimal number representing the color. 24bit RGB format or 32bit RGBA format with alpha channel are supported. For example, "#FF0000" is red. You can also use `rgb(rrr,ggg,bbb)`, where rrr, ggg, and bbb are decimal numbers. The final way uses a new InternalRAM color variable, a 32-bit integer. This can be referenced using `Amulet:InternalRAM.color.(x)` where x is an integer from 0 to 255. This gives the ability to control the color of objects dynamically at runtime if desired.

The real graphical power comes when the user supplies the image for the widgets instead of the OS supplied drawings. This facilitates the transition from layered image files you might receive from marketing or graphics artists, which allows the engineer to focus on making the product work and with little effort implement the concept that the artists created.

The Color processor has a few new peripherals to make it easier to interface with a wide range of displays. Many displays require some form of SPI initialization, such as LCD orientation, modes of operation, etc. These can now be done with simple commands in HTML and driven by the chips own SPI lines. There are also GPIO available to drive some UI-related I/O. A couple of these GPIO can be PWM ports, which are implemented using the new PWM widget, also right in the HTML.

In conclusion, the fastest way to a Color GUI using Amulet's new chip is currently through an Amulet Monochrome Starter Kit. We hope this paper gave you some detailed insight onto just how simple this transition can be.



Tel (408) 374-4956  
Fax (408) 374-4941  
[www.AmuletTechnologies.com](http://www.AmuletTechnologies.com)  
[Sales@AmuletTechnologies.com](mailto:Sales@AmuletTechnologies.com)  
[Support@AmuletTechnologies.com](mailto:Support@AmuletTechnologies.com)  
700 Gale Drive, Suite 190  
Campbell, CA 95008

Author:  
Brian Deters, FAE  
[BrianDeters@AmuletTechnologies.com](mailto:BrianDeters@AmuletTechnologies.com)